Computer Science: GCSE to A-level progression (8525 to 7517)

Knowledge, skills and understanding from GCSE Computer Science will be refined and developed at A-level.

Computational thinking is at the core of Computer Science. It allows us to model problems and develop solutions using skills like abstraction, inference and algorithm design.

1. Fundamentals of algorithms

Representing algorithms

Level	Reference	Specification requirements	Example questions
GCSE	3.1.1	Understand and explain the terms algorithm, decomposition and abstraction. Use a systematic approach to problem solving and algorithm creation representing those algorithms using pseudo-code, program code and flowcharts. Explain simple algorithms in terms of their inputs, processing and outputs. Determine the purpose of simple algorithms.	8525 Specimen Paper 1, Questions 5, 12, 13 8520 Paper 1 June 2019 Questions 4, 7, 9
A-level	4.4.1	Problem solving. Following and writing algorithms. Abstraction, decomposition, composition, and automation.	7517 Paper 1 June 2019 Questions 3, 5 7517 Paper 2 June 2019 Question 10

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Efficiency of algorithms

Level	Reference	Specification requirements	Example questions
GCSE	3.1.2	Understand that more than one algorithm can be used to solve the same problem. Compare the efficiency of algorithms explaining how some algorithms are more efficient than others in solving the same problem.	8520 Paper 1 May 2019 Question 4.4
A-level	4.4.1.2	Be able to articulate how a program works, arguing for its correctness and its efficiency.	
	4.4.4.1	Understand that algorithms can be compared by expressing their complexity as a function relative to the size of the problem. Understand that the size of the problem is the key issue. Understand that some algorithms are more efficient than others time-wise and/or space-wise.	
	4.4.4	Classification of algorithms including Big-O; tractable and intractable problems; computable and non-computable problems and the Halting problem.	7517 Paper 1 June 2019 Question 1

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Searching and sorting algorithms

Level	Reference	Specification requirements	Example questions
GCSE	3.1.3 3.1.4	Understand and explain how the linear and binary search algorithms work; compare and contrast linear and binary search algorithms. Understand and explain how the merge sort and bubble sort algorithms work; compare and merge sort and bubble sort algorithms.	8525 Specimen Paper 1, Questions 7 8520 Paper 1 June 2019 Question 8 8525 Specimen Paper 1, Question 11
A-level	4.3.4 4.3.5	Know and be able to trace and analyse the complexity of the linear search, binary search, binary tree search, bubble sort, and merge sort algorithms.	7517 Paper 1 June 2019 Questions 1.1, 7.3

Additional topics

Level	Reference	Topic	Example questions
A-level	4.3.1	Graph-traversal	
	4.3.2	Tree-traversal	
	4.3.3.	Reverse Polish	
	4.3.6	Optimisation algorithms	
	4.4.5	A model of computation: the Turing machine	7517 Paper 1 June 2019 Question 2

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2. Programming

Data Types

Level	Reference	Specification requirements	Example questions
GCSE	3.2.1	Understand the concept of a data type. Understand and use the following appropriately: • integer • real • Boolean • character • string.	8525 Specimen Paper 1, Questions 3.4, 7.1, 7.2 8520 Paper 1 June 2019 Question 7.2, 10.1
A-level	 4.1.1.1 4.1.1.16	As for 8525, plus: Understand and use the following appropriately: date/time; pointer/reference; records (or equivalent); arrays (or equivalent). Define and use user-defined data types based on language-defined (built-in) data types. Be familiar with the use of recursive techniques in programming languages (general and base cases and the mechanism for implementation). Be able to solve simple problems using recursion.	7517 Paper 1 June 2019 Question 7.1

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Programming concepts

Level	Reference	Specification requirements	Example questions
GCSE	3.2.2	Use, understand and know how the following statement types can be combined in programs: ● variable declaration ● constant declaration ● assignment ● iteration ● selection ● subroutine (procedure/function). Use definite (count controlled) and indefinite (condition controlled) iteration, including indefinite iteration with the condition(s) at the start or the end of the iterative structure Use nested selection and nested iteration structures. Use meaningful identifier names and know why it is important to use them.	8525 Specimen Paper 1, Questions 3, 4, 5, 6, 8, 9 8520 Paper 1 June 2019 Questions 7, 10
A-level	4.1.1.2	As for 8525.	7517 Paper 1 June 2019 Question 12

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Programming language operations

Level	Reference	Specification requirements	Example questions
GCSE	3.2.3	Be familiar with and be able to use: • addition • subtraction • multiplication • real division • integer division, including remainders.	8525 Specimen Paper 1, Questions 14, 15 8520 Paper 1 June 2019 Question 3
	3.2.4	Be familiar with and be able to use: • equal to • not equal to • less than • greater than • less than or equal to • greater than or equal to.	
	3.2.5	Be familiar with and be able to use: • NOT • AND • OR.	
A-level		As for 8525, plus:	7517 Paper 1 June 2019 Question 13
	4.1.1.3	• exponentiation • rounding • truncation.XOR	
	4.1.1.5	Be able to explain the differences between a variable and a constant.	
	4.1.1.6	Be able to explain the advantages of using named constants.	

Data structures

Level	Reference	Specification requirements	Example questions
GCSE	3.2.6	Understand the concept of data structures. Use arrays and records (or equivalent) in the design of solutions to simple problems.	
A-level	4.2	As for 8525 plus: Be familiar with the concept and uses of a: ● queue ● stack ● graph ● tree ● hash table ● dictionary ● vector. Be able to distinguish between static and dynamic structures and compare their uses, as well as explaining the advantages and disadvantages of each. Describe the creation and maintenance of data within: ● queues (linear, circular, priority) ● stacks ● hash tables. (for details see sections 4.2.2-8)	7517 Paper 1 June 2019 Questions 7.5, 7.6, 8

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Input/output

Level	Reference	Specification requirements
GCSE	3.2.7	Be able to obtain user input from the keyboard. Be able to output data and information from a program to the computer display.
A-level	4.2.1.3	Be able to read/write from/to a text file or a binary (non- text) file.

String handling operations in a programming language

Level	Reference	Specification requirements	Example questions
GCSE	3.2.8	Understand and be able to use: ● length ● position ● substring ● concatenation ● convert character to character code ● convert character code to character ● string conversion operations.	8525 Specimen Paper 1, Question 2 8520 Paper 1 June 2019 Question 1
A-level	4.1.1.7	Be familiar with and be able to use the attributes and operations above.	

Random number generation in a programming language

Level	Reference	Specification requirements	Example questions
GCSE	3.2.9	Be able to use random number generation.	
A-level	4.1.1.8	Be familiar with, and be able to use, random number generation.	7517 Paper 1 June 2019 Question 10

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Structured programming and subroutines (procedures and functions)

Level	Reference	Specification requirements	Example questions
GCSE	3.2.10	Understand the concept of subroutines. Explain the advantages of using subroutines in programs. Describe the use of parameters to pass data within programs. Use subroutines that return values to the calling routine. Know that subroutines may declare their own variables, called local variables, and that local variables usually • only exist while the subroutine is executing • are only accessible within the subroutine. Use local variables and explain why it is good practice to do so. Describe the structured approach to programming. Explain the advantages of the structured approach.	8525 Specimen Paper 1, Question 10 8520 Paper 1 June 2019 Question 10

Level	Reference	Specification requirements	Example questions
A-level	4.1.1.10	Be familiar with subroutines and their uses, know how to describe them and explain the advantages of using them	7517 Paper 1 June 2019 Questions 7.2, 9, 11 7517 Paper 2 June 2019 Question 10
	4.1.1.11	Be able to describe the use of parameters to pass data within programs. Be able to use subroutines with interfaces.	
	4.1.1.12	Be able to use subroutines that return values to the calling routine.	
	4.1.1.13	Know and describe the role of local variables in subroutines. Be able to use local variables and explain why it is good practice to do so.	
	4.1.1.14	Be able to contrast local variables with global variables.	
	4.1.1.15	Be able to explain the use of stack frames.	
	4.1.2	Understand the characteristics of the procedural- and object-oriented programming paradigms, and have experience of programming in each. Be familiar with concepts and design principles (details given in ss 4.1.2.2 and 4.1.2.3) Be able to write object-oriented programs. Be able to draw and interpret class diagrams.	

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Robust and secure programming

Level	Reference	Specification requirements	Example questions
GCSE	3.2.11	Be able to write simple data validation and authentication routines. Understand what is meant by testing in the context of algorithms and programs. Be able to correct errors within algorithms and programs. Understand what test data is and describe the following types of test data: • normal (typical) • boundary (extreme) • erroneous data. Be able to select and justify the choice of suitable test data for a given problem. Understand that there are different types of error: • syntax error • logic error. Be able to identify and categorise errors within algorithms and programs.	8525 Specimen Paper 1, Questions 16, 17 8520 Paper 1 Jun 2019 Questions 3.3, 6.7

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Level	Reference	Specification requirements	Example questions
A-level	4.1.1.9	Be familiar with the concept of exception handling. Know how to use exception handling in a programming language with which students are familiar.	7517 Paper 1 June 2019 Question 7.4
	4.4.2 4.4.2.1 4.4.2.2. 4.4.2.3 4.4.2.4 4.4.3	Regular languages. Finite state machines (FSMs) with and without output. Maths for regular expressions. Regular expressions. Regular language. Context-free languages; Backus-Naur Form (BNF)/syntax diagrams.	7517 Paper 1 June 2019 Question 4
	4.6.2	Classification of programming languages.	
	4.6.3	Types of program translator.	

Additional topics

Level	Reference	Topic	Example questions
A-level	4.12	Fundamentals of functional programming (Details in sections 4.12.1-3)	
	4.13	Systematic approach to problem solving (Details in sections 4.13.1.1-5)	7517 Paper 1 June 2019 Questions 3.1, 12

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3. Fundamentals of data representation

Number Bases

Level	Reference	Specification requirements	Example questions
GCSE	3.3.1	Understand the following number bases: • decimal (base 10) • binary (base 2) • hexadecimal (base 16). Understand that computers use binary to represent all data and instructions. Explain why hexadecimal is often used in computer science.	8520 Paper 1 June 2019 Question 2.1
A-level	4.5.1 4.5.2	Number systems: natural numbers, integers, rational, irrational, real and ordinal numbers; counting and measurement. Be familiar with the concept of a number base, in particular: • decimal (base 10) • binary (base 2) • hexadecimal (base 16).	7517 Paper 2 June 2019 Question 7

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Converting between number bases

Level	Reference	Specification requirements	Example questions
GCSE	3.3.2	Understand how binary can be used to represent whole numbers. Understand how hexadecimal can be used to represent whole numbers. Be able to convert in both directions between: • binary and decimal • binary and hexadecimal • decimal and hexadecimal.	8525 Specimen Paper 2, Question 1 8520 Paper 2 June 2019 Question 1
A-level	4.5.2	Convert between decimal, binary and hexadecimal number bases. Be familiar with, and able to use, hexadecimal as a shorthand for binary and to understand why it is used in this way.	

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Units of information

Level	Reference	Specification requirements	Example questions
GCSE	3.3.3	Know that: • a bit is the fundamental unit of information • a byte is a group of 8 bits. Know that quantities of bytes can be described using prefixes. Know the names, symbols and corresponding values for the decimal prefixes: • kilo, 1 kB is 1,000 bytes • mega, 1 MB is 1,000 kilobytes • giga, 1 GB is 1,000 Megabytes • tera, 1 TB is 1,000 Gigabytes. Be able to compare quantities of bytes using the prefixes above.	8525 Specimen Paper 2, Question 2.1 8520 Paper 2 June 2019 Question 2.2
A-level	4.5.3.1 4.5.3.2	As for 8525, plus: Know that the 2n different values can be represented with *n* bits. Know that quantities of bytes can be described using binary prefixes representing powers of 2 or using decimal prefixes representing powers of 10 Know the names, symbols and corresponding powers of 2 for binary prefixes.	7517 Paper 2 June 2019 Question 12.1

Binary arithmetic

Level	Reference	Specification requirements	Example questions
GCSE	3.3.4	Be able to add together up to three binary numbers. Be able to apply a binary shift to a binary number. Describe situations where binary shifts can be used.	8525 Specimen Paper 2, Question 1.4
A-level	4.5.4	Binary number systems (Details in 4.5.4.1-9)	7517 Paper 2 June 2019 Questions 4, 11

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Character encoding

Level	Reference	Specification requirements	Example questions
GCSE	3.3.5	Understand what a character set is and be able to describe the following character encoding methods: • 7-bit ASCII • Unicode. Understand that character codes are commonly grouped and run in sequence within encoding tables. Describe the purpose of Unicode and the advantages of Unicode over ASCII. Know that Unicode uses the same codes as ASCII up to 127.	8525 Specimen Paper 2, Questions 1.5, 1.6 8520 Paper 1 June 2019 Question 1.4 8520 Paper 2 June 2019 Question 3
A-level	4.5.5.1 4.5.5.2 4.5.5.3	Differentiate between the character code representation of a decimal digit and its pure binary representation. Describe ASCII and Unicode coding systems for coding character data and explain why Unicode was introduced. Describe and explain the use of: • parity bits • majority voting • checksums • check digits	

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Representing images and sound

Level	Reference	Specification requirements	Example questions
GCSE	3.3.6	Understand what a pixel is and be able to describe how pixels relate to an image and the way images are displayed. Describe the following for bitmaps: • size in pixels • colour depth. Know that the size of a bitmap image is measured in pixels (width x height). Describe how a bitmap represents an image using pixels and colour depth. Describe using examples how the number of pixels and colour depth can affect the file size of a bitmap image. Calculate bitmap image file sizes based on the number of pixels and colour depth. Convert binary data into a bitmap image. Convert a bitmap image into binary data.	8520 Paper 1 June 2019 Question 9
	3.3.7	Understand that sound is analogue and that it must be converted to a digital form for storage and processing in a computer. Understand that analogue signals are sampled to create the digital version of sound. Describe the digital representation of sound in terms of: • sampling rate • sample resolution. Calculate sound file sizes based on the sampling rate and the sample resolution.	8525 Specimen Paper 2, Question 6

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Level	Reference	Specification requirements	Example questions
A-level	4.5.6	Describe how bit patterns may represent other forms of data, including graphics and sound. Understand the difference between analogue and digital: ● data ● signals. Describe analogue/digital conversion. Explain bitmaps. Be familiar with typical metadata. Explain and use vector graphics. Digital representation of sound including MIDI (full details in sections 4.5.6.1-9)	7517 Paper 1 June 2019 Question 6 7517 Paper 2 June 2019 Question 13

Data Compression

Level	Reference	Specification requirements	Example questions
GCSE	3.3.8	Explain what data compression is. Understand why data may be compressed and that there are different ways to compress data. Explain how data can be compressed using Huffman coding. Be able to interpret Huffman trees. Be able to calculate the number of bits required to store a piece of data compressed using Huffman coding. Be able to calculate the number of bits required to store a piece of uncompressed data in ASCII. Represent data in RLE frequency/data pairs. Explain how data can be compressed using run length encoding (RLE).	8525 Specimen Paper 2, Questions 1.7, 1.8 8520 Paper 1 June 2019 Question 6 8520 Paper 2 June 2019 Question 8
A-level	4.5.6.9	Know why images and sound files are often compressed and that other files, such as text files, can also be compressed. Understand the difference between lossless and lossy compression and explain the advantages and disadvantages of each. Explain the principles behind the following techniques for lossless compression: • run length encoding (RLE) • dictionary-based methods.	7517 Paper 2 June 2019 Question 3

4. Computer Systems

Hardware and software

Level	Reference	Specification requirements
GCSE	3.4.1	Define the terms hardware and software and understand the relationship between them.
A-level	4.6.1.2	As for 8225, plus: Understand the need for, and attributes of, different types of software.
	4.7.1	Internal hardware components of a computer.

Boolean Logic

Level	Reference	Specification requirements	Example questions
GCSE	3.4.2	Construct truth tables for the following logic gates: • NOT • AND • OR • XOR Construct truth tables for simple logic circuits. Interpret the results of simple truth tables. Create, modify and interpret simple logic circuit diagrams, and simple Boolean expressions. Create the Boolean expression for a simple logic circuit. Create a logic circuit from a simple Boolean expression.	8525 Specimen Paper 2, Question 8 8520 Paper 1 June 2019 Question 5 8520 Paper 2 June 2019 Question 15

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Level	Reference	Specification requirements	Example questions
A-level	4.6.4	Logic gates: as above plus • NAND • NOR. Be familiar with drawing and interpreting logic gate circuit diagrams involving one or more of, NOT, AND, OR, XOR, NAND, NOR gates. Complete a truth table for a given logic gate circuit. Write a Boolean expression for a given logic gate circuit. Draw an equivalent logic gate circuit for a given Boolean expression. Recognise and trace the logic of the circuits of a half-adder and a full-adder. Construct the circuit for a half-adder. Be familiar with the use of the edge-triggered D- type flip-flop as a memory unit.	7517 Paper 2 June 2019 Question 8
	4.6.5	Be familiar with the use of Boolean identities and De Morgan's laws to manipulate and simplify Boolean expressions.	

Software classification

Level	Reference	Specification requirements	Example questions
GCSE	3.4.3	Explain what is meant by: • system software • application software. Give examples of both types of software. Understand the need for, and functions of, operating systems (OS) and utility programs. Understand that the OS handles management of the: • processor(s) • memory • I/O devices • applications • security.	8520 Paper 2 June 2019 Question 5
A-level	4.6.10	Understand the need for, and functions of the following system software: • operating systems (OSs) • utility programs • libraries • translators (compiler, assembler, interpreter. Understand that a role of the operating system is to hide the complexities of the hardware. Know that the OS handles resource management, managing hardware to allocate processors, memories and I/O devices among competing processes.	7517 Paper 2 June 2019 Question 1

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Classification of programming languages and translators

Level	Reference	Specification requirements	Example questions
GCSE	3.4.4	Know that there are different levels of programming language: • low-level language • high-level language. Explain the main differences between low-level and high-level languages. Know that machine code and assembly language are considered to be low-level languages and explain the differences between them. Understand that all programming code written in high-level or assembly languages must be translated. Understand that machine code is expressed in binary and is specific to a processor or family of processors. Understand the advantages and disadvantages of low-level language programming compared with high-level language programming. Understand that there are three common types of program translator: • interpreter • complier • assembler. Explain the main differences between these three types of translator. Understand when it would be appropriate to ruse each type of translator.	8525 Specimen Paper 2, Question 7 8520 Paper 1 June 2019 Question 2

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Level	Reference	Specification requirements	Example questions
A-level	4.6.2	Show awareness of the development of types of programming languages and their classification into low-and high-level languages, and be able to understand and explain aspects of machine-code, assemblers, compilers and interpreters.	7517 Paper 2 June 2019 Questions 5, 10

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Systems architecture

Level	Reference	Specification requirements	Example questions
GCSE	3.4.5	Explain the role and operation of main memory and the following major components of a central processing unit (CPU) within the Von Neumann architecture: • arithmetic logic unit • control unit • clock • register • bus. Explain the effect of the following on the performance of the CPU: • clock speed • number of processor cores • cache size Understand and explain the Fetch-Execute cycle. Understand the different types of memory within a computer: • RAM • ROM • Cache • Register. Know what the different types of memory are used for and why they are required. Understand the differences between main memory and secondary storage. Understand the differences between RAM and ROM. Understand why secondary storage is required. Be aware of different types of secondary storage (solid state, optical and magnetic).	8525 Specimen Paper 2, Question 4 8520 Paper 2 June 2019 Question 4, 10, 16

		Explain the operation of and discuss the advantages and disadvantages of solid state, optical and magnetic storage. Explain the term 'cloud storage'. Explain the advantages and disadvantages of cloud storage when compared to local storage. Understand the term 'embedded system' and explain how an embedded system differs from a non-embedded system.	
A-level	4.7.2 4.7.3 4.7.4	The stored program concept. Structure and role of the processor and its components External hardware devices	7517 Paper 2 June 2019 Question 12.2

Additional topics

Level	Reference	Topic
A-level	4.4.2 4.4.3	Regular languages. Context-free languages.

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5. Fundamentals of computer networks

Level	Reference	Specification requirements	Example questions
GCSE	3.5	Define what a computer network is. Discuss the advantages and disadvantages of computer networks. Describe the main types of computer network including: • Personal Area Network (PAN) • Local Area Network (LAN) • Wide Area Network (WAN). Understand that networks can be wired or wireless. Discuss the advantages and disadvantages of wireless networks as opposed to wired networks. Describe the following common LAN topologies: • star • bus. Define the term 'network protocol'. Explain the purpose and use of common network protocols including: • Ethernet • Wi-Fi • TCP (Transmission Control Protocol) • UDP (User Datagram Protocol) • IP (Internet Protocol) • HTTP (Hypertext Transfer Protocol) • HTTPS (Hypertext Transfer Protocol Secure) • FTP (File Transfer Protocol) • email protocols: • SMTP (Simple Mail Transfer Protocol)	8525 Specimen Paper 2, Question 3, 10.2 8520 Paper 2 June 2019 Questions 11, 12.1, 13

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		• IMAP (Internet Message Access Protocol). Understand the need for, and importance of, network security. Explain the following methods of network security: • authentication • encryption • firewall • MAC address filtering. Describe the 4 layer TCP/IP model: • application layer • transport layer • internet layer • link layer. Understand that the HTTP, HTTPS, SMTP, IMAP and FTP protocols operate at the application layer. Understand that the TCP and UDP protocols operate at the transport layer. Understand that the IP protocol operates at the internet layer.	
A-level	4.9.1 4.9.2 4.9.3 4.9.4	Communication methods and basics (details in sections 4.9.1.1-2). Networking (details in sections 4.9.2.1-3). The Internet (details in sections 4.9.3.1-2). 4.9.4 The Transmission Control Protocol/Internet Protocol (TCP/IP) protocol. (details in sections 4.9.4.1-11).	7517 Paper 2 June 2019 Questions 2, 9

6. Cyber security

Level	Reference	Specification requirements	Example questions
GCSE	3.6.1	Be able to define the term cyber security and be able to describe the main purposes of cyber security.	
A-level	4.9.3.2	Internet security. Understand how a firewall works (packet filtering, proxy server, stateful inspection). Explain symmetric and asymmetric (private/ public key) encryption and key exchange. Explain how digital certificates and digital signatures are obtained and used. Discuss worms, trojans and viruses, and the vulnerabilities that they exploit. Discuss how improved code quality, monitoring and protection can be used to address worms, trojans and viruses.	7517 Paper 2 June 2019 Questions 14.3. 14.4
	4.5.6.10	Understand what is meant by encryption and be able to define it. Be familiar with Caesar and Vernam ciphers and be able to apply each to encrypt a plaintext message and decrypt a ciphertext. Be able to explain the security offered by each. Compare Vernam cipher with ciphers that depend on computational security.	7517 Paper 2 June 2019 Questions 14.1, 14.2

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Cyber security threats

Level	Reference	Specification requirements	Example questions
GCSE	3.6.2	Understand and be able to explain the following cyber security threats: • social engineering techniques • malicious code (malware) • pharming • weak and default passwords • misconfigured access rights • removable media • unpatched and/or outdated software. Explain what penetration testing is and what it is used for.	8520 Paper 2 June 2019 Question 12.3, 14
A-level	4.8.1	Be able to discuss the challenges facing legislators in the digital age.	

Social engineering

Level	Reference	Specification requirements	Example questions
GCSE	3.6.2.1	Define the term social engineering. Describe what social engineering is and how it can be protected against. Explain the following forms of social engineering: • blagging (pretexting) • phishing • shouldering (or shoulder surfing).	8525 Specimen Paper 2, Question 5
A-level	4.8.1	Show awareness of current individual (moral), social (ethical), legal and cultural opportunities and risks of computing.	

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Malicious code

Level	Reference	Specification requirements
GCSE	3.6.2.2	Define the term 'malware'. Describe what malware is and how it can be protected against. Describe the following forms of malware: ● computer virus ● trojan ● spyware ● adware.
A-level	4.9.3.2	Discuss worms, trojans and viruses, and the vulnerabilities that they exploit. Discuss how improved code quality, monitoring and protection can be used to address worms, trojans and viruses.

Methods to detect and prevent cyber security threats

Level	Reference	Specification requirements	Example questions
GCSE	3.6.3	Understand and be able to explain the following security measures: ● biometric measures (particularly for mobile devices) ● password systems ● CAPTCHA (or similar) ● using email confirmations to confirm a user's identity ● automatic software updates.	8525 Specimen Paper 2, Question 10 8520 Paper 2 June 2019 Question 12.2
A-level	4.9.3.2	Explain symmetric and asymmetric (private/ public key) encryption and key exchange. Explain how digital certificates and digital signatures are obtained and used.	

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7. Relational databases and structured query language (SQL)

Relational databases

Level	Reference	Specification requirements	Example questions
GCSE	3.7.1	Explain the concept of a database. Explain the concept of a relational database. Understand the following database concepts: • table • record • field • primary key • foreign key. Understand that the use of a relational database facilitates the elimination of data inconsistency and data redundancy.	8525 Specimen Paper 2, Question 9
A-level	4.10.2	Explain the concept of a relational database. Be able to define the terms: • attribute • primary key • composite primary key • foreign key. (and see next section).	

Structured query language (SQL)

Level	Reference	Specification requirements	Example questions

GCSE	3.7.2	Be able to use SQL to retrieve data from a relational database, using the commands:
		• SELECT
		• FROM
		• WHERE
		• ORDER BY … ASC | DESC
		
		Be able to use SQL to insert data into a relational database using the commands.
		`INSERT INTO table_name (column1, column 2 …)`
		`VALUES (value1, value2 …)`
		
		Be able to use SQL to edit and delete data in a database using the commands.
		`UPDATE table_name`
		`SET column1 = value1, column2 = value2 ... WHERE condition`
		`DELETE FROM table_name WHERE condition`
			8525 Specimen Paper 2, Question 9.3, 9.4

A-level	4.10	Fundamentals of databases. (Details in sections 4.10.1-5).	7517 Paper 2 June 2019 Question 6
	4.11	Big Data. (Details in section 4.11.1).	

8. Ethical, legal and environmental impacts of digital technology on wider society, including issues of privacy

Level	Reference	Specification requirements	Example questions
GCSE	3.8	Explain the current ethical, legal and environmental impacts and risks of digital technology on society. Where data privacy issues arise, these should be considered.	8520 Paper 2 June 2019 Question 9
A-level	4.8	Consequences of uses of computing.	

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